

## **PATENT CLAIMS**

1. Vibratory apparatus for driving and extracting piles, comprising bearings for rotating unbalanced masses (11, 12), said unbalanced masses (11, 12) being arranged in a bearing flange (1) by means of a bearing journal (10) and a bearing bush (3), or comprising bearings for shafts, on which the unbalanced masses are mounted, **characterised in that**
  - the bearings are fluid-lubricated sliding bearings
  - each bearing bush (3) has at least two channels (bearing bush channels) (4a - 4h) extending in the radial direction,
  - each bearing bush (3) has, on at least one end, groove-like depressions (6a-6d) that extend in the radial direction or such grooves that are introduced into the axial running faces (7) that lie against the bearing bush (3) of the unbalanced masses (11, 12) or into the shafts (10) that are supported in the sliding bearings,
  - that surface of the bearing journal (10) that is surrounded by the bearing bush (3), or of the shaft, has one or more groove-like depressions (13, 14),
2. Vibratory apparatus for driving and extracting piles according to claim 1, characterised in that the bearing bush (3) has eight channels (bearing bush channels) (4a-4h) that run in the radial direction.
3. Vibratory apparatus for driving and extracting piles according to claims 1 and 2, characterised in that the outside of the bearing bush (3), which is surrounded by the unbalanced mass flange (1), has a surrounding groove-like depression (5), channels (bearing bush channels) (4a-4h), which lead in a radial direction towards the inside of the bearing bush (3), proceeding from this groove-like depression (5).

4. Vibration apparatus for driving and extracting piles according to one of the preceding claims, characterised in that at least one of the ends faces of each bearing bush (3) is designed as a running face (7).
5. Vibration apparatus for driving and extracting piles according to one of the preceding claims, characterised in that the running face (7) is provided with groove-like depressions (6a-6d) in a radial direction, or such grooves are introduced into the axial running faces, lying against the bearing bush, of the unbalanced masses (11, 12) or into the shafts that are supported in the sliding bearings.
6. Vibration apparatus for driving and extracting piles according to one of the preceding claims, characterised in that the surface that is surrounded by the bearing bush (3) of each bearing journal (10) or of each shaft has at least one groove-like depression in an azimuthal direction (13) and/or at least one groove-like depression in an axial direction (14).
7. Vibration apparatus for driving and extracting piles according to one of the preceding claims, characterised in that the length of the groove-like depressions (13, 14) on the surface surrounded by the bearing bush (3) of each bearing journal (10) or of each shaft in the azimuthal direction (13) is dimensioned such that it joins the openings of at least two adjacent bearing bush channels (4a-4h) and during the rotation always remains in connection with at least one of the channels.
8. Vibration apparatus for driving and extracting piles according to one of the preceding claims, characterised in that that surface that is surrounded by the bearing bush (3) of each bearing journal (10) comprises one or more groove-like depressions (14) that extend in an axial direction and end blindly at both ends.

9. Vibration system for driving and extracting piles according to one of the preceding claims, characterised in that the play between the bearing journal (10) and the bearing bush (3) is about 1-3 thousandths of the bearing journal diameter.
10. Vibration system for driving and extracting piles according to one of the preceding claims, characterised in that the bearing bushes (3) are made of copper/aluminium alloys.